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Taxonomic study of the genus *Christophia* Ragonot, 1887 in China (Lepidoptera: Pyralidae, Phycitinae)

J. Y. Liu & H. H. Li

Abstract

The genus *Christophia* Ragonot, 1887 in China is reviewed. Four species are treated, of which *C. valvispinifera* Liu & Li, sp. n., *C. paragranulella* Liu & Li, sp. n. are described as new and *C. baliella* (Ragonot, 1888) is newly recorded for this country. Images of adults and illustrations of genital structures are provided, along with a key to the Chinese species.

KEY WORDS: Lepidoptera, Pyralidae, Phycitinae, *Christophia*, new species, China.

Estudio taxonómico del género *Christophia* Ragonot, 1887 en China
(Lepidoptera: Pyralidae, Phycitinae)

Resumen

Se revisa el género *Christophia* Ragonot, 1887 en China. Se tratan cuatro especies, de las cuales se describen como nuevas a *C. valvispinifera* Liu & Li, sp. n., *C. paragranulella* Liu & Li, sp. n. y *C. baliella* (Ragonot, 1888) es nuevamente citada para este país. Se proporcionan imágenes de los adultos e ilustran las estructuras genitales, al mismo tiempo que una clave de las especies chinas.

PALABRAS CLAVE: Lepidoptera, Pyralidae, Phycitinae, *Christophia*, nueva especie, China.

Introduction

Christophia was established by Ragonot in 1887, with *C. callipterella* Ragonot, 1887 as the type. It is a small genus of 13 valid species, occurring in China, Mongolia, Russia, Turkmenistan and Uzbekistan (ROESLER, 1989, 1993; FALKOVITSH, 1999). *Christophia* can be easily distinguished by the frons with a distinct laterally compressed projection, which is apically bifurcate, trifurcate, or not furcate, or with a tube-shaped projection as in *C. ectypella* (RAGONOT, 1888). Sometimes the projection is concealed in the labial palpus and scales of the vertex (Fig. 1). *Christophia* is represented by the combination of the following characters: the flagellum in male with one dorsal spine on each of the basal third to eighth segments; M_2 and M_3 arising from the same point on the forewing; M_2 and M_3 stalked in basal 3/4, M_{2+3} and CuA_1 stalked in basal 1/3 on the hindwing (Fig. 5); the transtilla absent or one pair, the Y-shaped or trapezium-shaped juxta, the culcita one or two paired, and the eighth sternite without median projection on the anterior margin in the male genitalia; and the ductus seminalis from the corpus bursae posteriorly in the female genitalia.

Prior to this study, *C. granulella* (Zerny, 1914) is the only species recorded in China. Unfortunately, we have not collected this species and are unable to examine its type during this

study. In the present paper, we report three more species from China, including two new species to science and one newly recorded species for China.

Material and methods

The examined specimens were collected by using light traps. Terminology primarily follows ROESLER (1993). Genitalia dissection and mounting method follow LI (2002). Images of adults were taken using a NIKON D300 digital camera. Images of wing venation and genitalia were prepared using an OLYMPUS C-7070WZ attached to an OLYMPUS BX51 microscope. All the studied specimens, including the types of the new species, are deposited in the Insect Collection, College of Life Sciences, Nankai University, Tianjin, China.

Taxonomic accounts

Christophia Ragonot, 1887

Christophia Ragonot, 1887: 233. Type species: *Christophia callipterella* Ragonot, 1887, by original designation.

Centrometopia Ragonot, 1887: 236. Type species: *Centrometopia interruptella* Ragonot, 1887, by subsequent designation.

Key to Chinese species of *Christophia* based on genitalia

1. Male.....2
- Female
2. Valva with one sclerotized band extending from below base of costa to about ventral 3/4, phallus with one cornutus (Fig. 6).....*C. valvispinifera* Liu & Li, sp. n.
- Valva without sclerotized band, phallus with two cornuti
3. Clasper bluntly triangular, eighth sternite curved on anterior margin, culcita one pair (Fig. 7).....*C. paragranulella* Liu & Li, sp. n.
- Clasper rounded, eighth sternite convex medially on anterior margin, culcita two paired (ROESLER, 1993: Fig. 40m)
- C. granulella* (Zerny)
4. Signum composed of a few thorns (ROESLER, 1993: Fig. 40f)
- C. granulella* (Zerny)
- Signum composed of one or two sclerotized plates with thorns
5. Signum composed of one plate at middle of corpus bursae (Fig. 9)
- C. baliella* (Ragonot)
- Signum composed of two plates on posterior 1/3 of corpus bursae (Fig. 8)
- C. valvispinifera* Liu & Li, sp. n.

Christophia valvispinifera Liu & Li, sp. n. (Figs. 1a, 2, 5, 6, 8)

Type material: Holotype ♂, CHINA: Mt. Helan (38° 8' N, 105° 7' E), Alxa Zuoqi, Inner Mongolia Autonomous Region, 1683 m, 29-VII-2010, leg. Hongxia Liu and Zhiwei Zhang, genitalia slide no. LJY10670. Paratypes: 1 ♂, 1 ♀, same data as for holotype, genitalia slide no. LJY11060; 4 ♂♂, 1 ♀, Erenhot (43° 6' N, 112° 0' E), Inner Mongolia Autonomous Region, 960 m, 2-VIII-2002, leg. Zhiqiang Li and Dandan Zhang, genitalia slide nos. LJY10026, LJY11059, KDH05385; 1 ♀, Buyant (41° 8' N, 107° 0' E), Urad Houqi, Inner Mongolia Autonomous Region, 1075 m, 17-VIII-2006, leg. Zhiwei Zhang, genitalia slide no. LJY10293; 1 ♀, Suyukou (38° 7' N, 105° 9' E), Mt. Helan, Ningxia Hui Autonomous Region, 2000 m, 08-VIII-2006, leg. Feng Yang and Qi He, genitalia slide no. LJY10291.

Description: Adult (Figs. 1a, 2, 5) with wingspan 23.0-25.0 mm. Head grayish white or grayish brown. Frons with a distinct laterally compressed projection trifurcate apically. Antenna with scape grayish white to grayish brown, about 2.5 times longer than wide; flagellum yellowish

brown on ventral surface, grayish white and grayish brown alternately on dorsal surface. Labial palpus with first and second segments grayish white, mixed with brownish black; third segment grayish brown to brownish black, about 2/5 length of second. Proboscis grayish brown, mixed with brownish black at base. Patagium, thorax and tegula grayish brown to yellowish brown, mixed with brownish black. Forewing ground coloration grayish white tinged yellow, mixed with brownish black scales; costal and dorsal margins pale yellowish brown from base to postmedian line, somewhat forming a thin stripe separately; yellowish-brown along veins; antemedian line grayish white, extending from costal 1/4 to dorsal 1/3, obliquely straight, edged with a broad brownish black band along outer side anteriorly; discocellular stigmata brownish black, clearly separated; postmedian line grayish white, sinuate, edged with a broad brownish black transverse band along inner side and a short broad brownish black along outer side anteriorly; termen brownish black; cilia grayish brown, with a brown basal line. Hindwing grayish brown, outer margin brownish black; cilia grayish brown. Legs with femora and tibiae grayish white, mixed with brownish black; tarsi brownish black ringed with grayish white at apex of each tarsomere. Abdomen brownish yellow dorsally, grayish white ventrally.

Male genitalia (Figs. 6): Uncus subtriangular, almost twice as long as wide at base, rounded apically. Gnathos subulate, curved, pointed apically, about 1/3 length of uncus. Transtilla a pair of weakly sclerotized triangular plates. Valva nearly parallel dorso-ventrally, rounded at apex; costa extending to end of valva, slightly projected distally, acute at apex; with a thin sclerotized band extending from below base of costa to about ventral 3/4 and produced to a strong free apical spine; clasper bluntly triangular, sparsely covered with fine setae; sacculus slender, about 1/3 length of valva. Vinculum longer than 3/5 length of valva, rounded anteriorly. Juxta trapezium-shaped, concave at middle posteriorly. Phallus columned, about 4/5 length of valva, full of sclerotized thorns in distal 1/2; cornutus a thorn, about 2/3 length of phallus, placed at base of phallus. Eighth sternite (6a) arched on anterior margin. Culcita one pair.

Female genitalia (Fig. 8): Papillae anales elliptical, round posteriorly. Apophyses posteriores slightly longer than apophyses anteriores, reaching anterior margin of eighth tergum. Eighth tergum slightly concave medially on anterior margin. Antrum an inverted trapezium, densely spinous in posterior 3/4. Ductus bursae slightly longer than antrum. Corpus bursae ovate, membranous, densely spinous, about 2.5 times length of apophyses anteriores; signa two sclerotized plates, one elongate and another rounded, the other margined with large thorns, placed posteriorly; large rounded accessory sac arising from posterior 1/3 of corpus bursae; ductus seminalis from posterior end of corpus bursae near base of accessory sac.

Distribution: China (Inner Mongolia Autonomous Region, Ningxia Hui Autonomous Region).

Diagnosis: This new species is similar to *C. leucosiphon* Falkovitsh, 1999 in the male genitalia, but can be distinguished by the obtuse triangular clasper, the vinculum rounded anteriorly, and the trapezium juxta; in *C. leucosiphon*, the clasper is digitiform, the anterior margin of vinculum is straight, and the juxta is U-shaped. It is similar to *C. granulella* (Zerny, 1914) in the female genitalia, but can be distinguished by the apophyses posteriores slightly longer than the apophyses anteriores and the corpus bursae with two signa; in *C. granulella*, the apophyses posteriores are distinctly longer than the apophyses anteriores and the corpus bursae lacks the signum.

Etymology: The specific name is derived from the Latin prefix *valv-* (= valva), and *spinifer* (= spined), referring to the free apical spine of the sclerotized band on the valva.

***Christophia paragranulella* Liu & Li, sp. n. (Figs. 1b, 3, 7)**

Type material: Holotype ♂, CHINA: Buyant (41° 48' N, 107° 00' E), Urad Houqi, Inner Mongolia Autonomous Region, 1075 m, 17-VIII-2006, leg. Zhiwei Zhang, genitalia slide no. LJV09058. Paratypes: 1 ♂, Xiaoshang county (41° 54' N, 117° 42' E), Weichang County, Hebei

Province, 11-VII-2001, leg. Yanli Du and Shulian Hao, genitalia slide no. LJY09122; 1 ♂, Erenhot (43° 36' N, 112° 00' E), Inner Mongolia Autonomous Region, 960 m, 2-VIII-2002, leg. Zhiqiang Li and Dandan Zhang, genitalia slide no. RYD04307; 3 ♂♂, same data as for holotype, genitalia slide no. KDH05447; 1 ♂, Mt. Helan (38° 48' N, 105° 42' E), Alxa Zuoqi, Inner Mongolia Autonomous Region, 1683 m, 29-VII-2010, leg. Hongxia Liu and Zhiwei Zhang, genitalia slide no. LJY10612.

Description: Adult (Figs. 1b, 3) with wingspan 20.0-22.0 mm. Head grayish white except grayish brown medially. Frons with a distinct laterally compressed projection trifurcate apically. Antenna with scape grayish white to grayish brown, about 3 times longer than wide; flagellum yellowish brown on ventral surface, grayish white and grayish brown alternately on dorsal surface. Labial palpus with first and second segments grayish white, mixed with grayish brown; third segment pale yellowish brown, about 1/2 length of second. Proboscis yellowish brown, mixed with grayish white at base. Patagium, thorax and tegula grayish white to pale yellow. Forewing ground coloration grayish white, mixed with brownish black scales; costal and dorsal margins pale yellowish brown from base to postmedian line; yellowish-brown along veins; antemedian line grayish white, extending from costal 1/4 to dorsal 2/5, slightly curved, edged with a broad brownish black band along outer side anteriorly, sometimes a short thin brownish black band along inner side posteriorly; discocellular stigmata brownish black, clearly separated, sometimes faint; postmedian line grayish white, sinuate, edged with a broad brownish black band along inner side, with a broad brownish black anteriorly and yellowish brown posteriorly band along outer side; termen brownish black; cilia grayish brown, with a grayish white basal line. Hindwing grayish brown, except dark grayish brown on outer margin; cilia grayish brown. Legs with femora and tibiae grayish white to pale yellow, mixed with brownish black; tarsi brownish black ringed with grayish white at apex of each tarsomere. Abdomen brownish yellow dorsally, grayish white ventrally.

Male genitalia (Figs. 7): Uncus subtriangular, almost twice as long as wide at base, rounded apically. Gnathos subulate, curved, pointed apically, about 1/3 length of uncus. Transtilla a pair of weakly sclerotized triangular plates. Valva slender, narrowed at base, distal 1/2 nearly parallel dorso-ventrally, rounded at apex; costa extending to end of valva, slightly projecting distally, pointed apically; clasper bluntly triangular, sparsely covered with fine setae; sacculus slender, about 1/3 length of valva. Vinculum nearly 2/3 length of valva, rounded anteriorly. Juxta trapezium-shaped, concave at middle posteriorly. Phallus columned, about 4/5 length of valva, full of sclerotized thorns in distal 2/3; cornuti consisting of two thorns of equal length, about 3/5 length of phallus, placed at base of phallus. Eighth sternite (7a) arched on anterior margin. Culcita one pair.

Distribution: China (Hebei, Inner Mongolia Autonomous Region).

Diagnosis: This species is similar to *C. granulella* (Zerny, 1914) in the male genitalia, but can be distinguished by the clasper bluntly triangular, the eighth sternite arched on anterior margin and the culcita one pair; in *C. granulella* the clasper is rounded, the eighth sternite is obviously convex at middle on anterior margin and the culcita are two paired.

Etymology: The specific name is derived from the prefix *para-* (= similar), and species name *granulella*, referring to the similarity of the two species.

Christophia baliella (Ragonot, 1888) (Figs. 4, 9)

Centrometopia baliella Ragonot, 1888: 26. [Holotype: ♀, Asgabat, Turkmenistan, deposited in National Museum of Natural History, Paris, France].

Anoristia baliella (Ragonot, 1888): Rebel, 1901: 30.

Christophia baliella (Ragonot, 1888): Roesler, 1989: 2, 14.

Material examined: CHINA: 1 ♀, Burqin County (47° 42' N, 86° 54' E), Xinjiang Uyghur Autonomous Region, 504 m, 21-VII-2007, leg. Xinpu Wang *et al.*, genitalia slide no. LJY10077.

Diagnosis: Adult (Fig. 4) with wingspan 27.0 mm. This species is similar to *C. ectypella*

(Ragonot, 1888) externally, but can be distinguished by the forewing with one brownish black stigma at dorsal 2/3, and the corpus bursae with a signum and an accessory sac in the female genitalia (Fig. 9); in the latter species these characters are absent.

Distribution: China (Xinjiang Uygur Autonomous Region); Turkmenistan.

Remarks: This species was described on a single female specimen, with male still unknown to date. It is newly recorded for China.

Christophia granulella (Zerny, 1914)

Anoristia (Centrometopia) granulella Zerny, 1914: 311. [Holotype: ♂, Lop Nor Desert (Lob Noor), Xinjiang, China, deposited in Natural History Museum, Vienna, Austria].

Christophia granulella (Zerny, 1914): Roesler, 1989: 2, 14.

Diagnosis: According to ROESLER (1993), this species is similar to *C. callipterella* Ragonot, 1887 in the male genitalia, but can be distinguished by the phallus with two cornuti and the culcita two paired; in *C. callipterella* the phallus has three cornuti and the culcita is only one pair.

This species was described from Xinjiang, China. Unfortunately, we have not collected it and are unable to examine its type during this study.

Distribution: China (Xinjiang Uygur Autonomous Region).

Discussion

ROESLER (1993) transferred *Centrometopia ectypella* Ragonot, 1888 to *Christophia* Ragonot. However, its projection on the frons is tube-shaped instead of laterally compressed, and its corpus bursae lacks signum or sclerifications as compared with members of *Christophia*. Therefore, *Centrometopia ectypella* Ragonot, 1888 may not belong to *Christophia* Ragonot. FALKOVITSH (1999) described *Christophia tessulata* Falkovitsh, 1999 from Uzbekistan, which is similar to *Myelois sieversi* Christoph, 1876 by having a similar frons. However, the latter species was transferred to *Bazaria* Ragonot, 1887 by ROESLER (1993). Hence we suggest *Christophia tessulata* Falkovitsh, 1999 should be transferred to *Bazaria* Ragonot.

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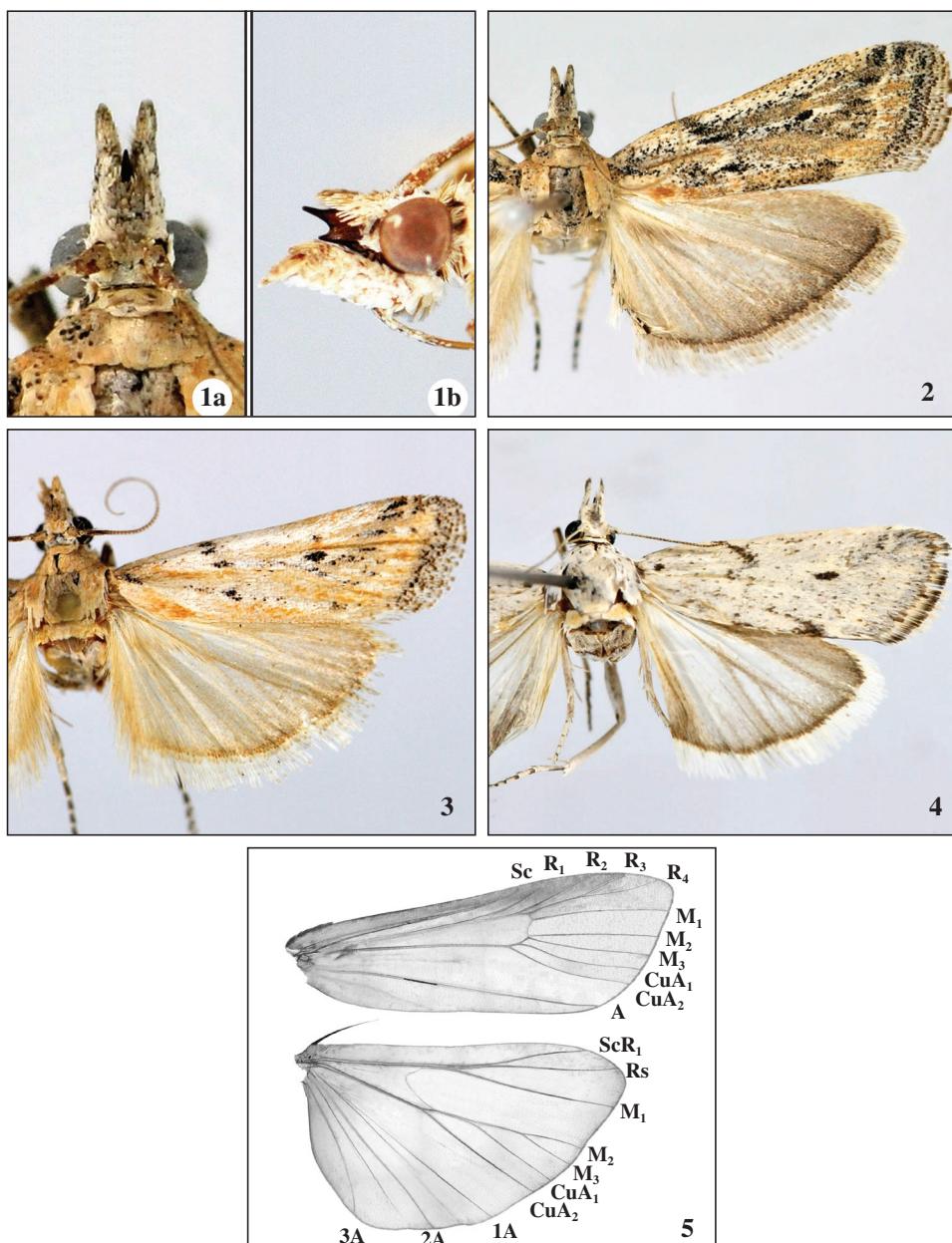
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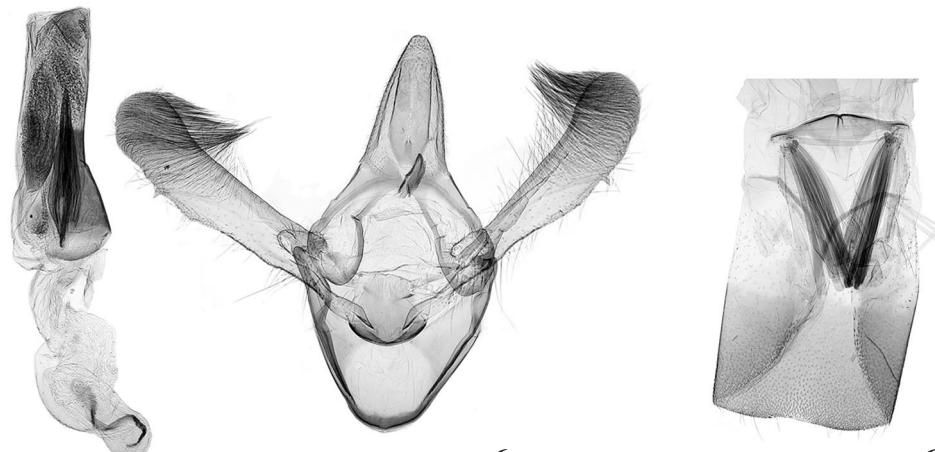
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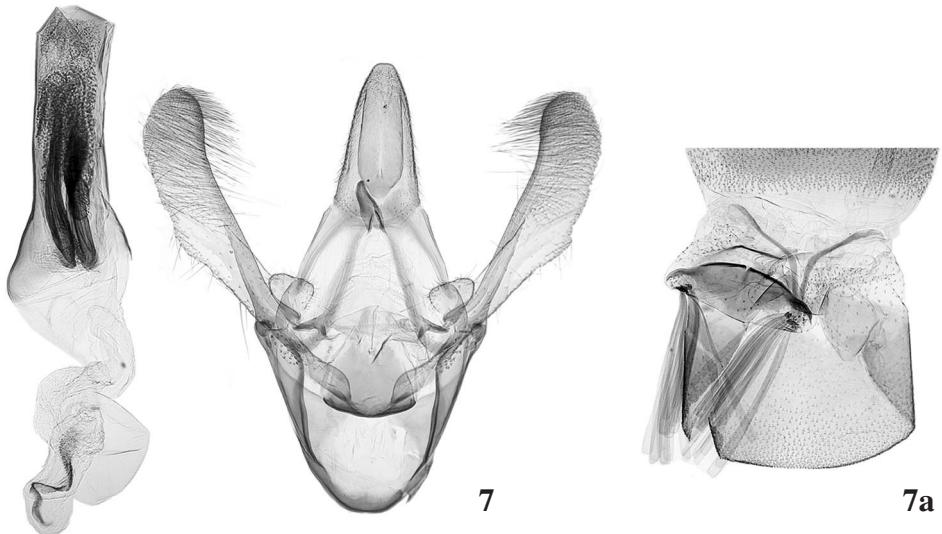


Figs. 1-5.—Adults of *Christophia* spp. **1.** Head, showing projection of frons: **1a.** *C. valvispinifera* Liu & Li, sp. n., holotype, male, dorsal view. **1b.** *C. paragranulella* Liu & Li, sp. n., paratype, male, lateral view. **2.** *C. valvispinifera* sp. n., holotype, male. **3.** *C. paragranulella* Liu & Li, sp. n., paratype, male. **4.** *C. baliella* (Ragonot), female. **5.** Wing venation. *Christophia valvispinifera* sp. n., paratype, slide No. LJY10026W.



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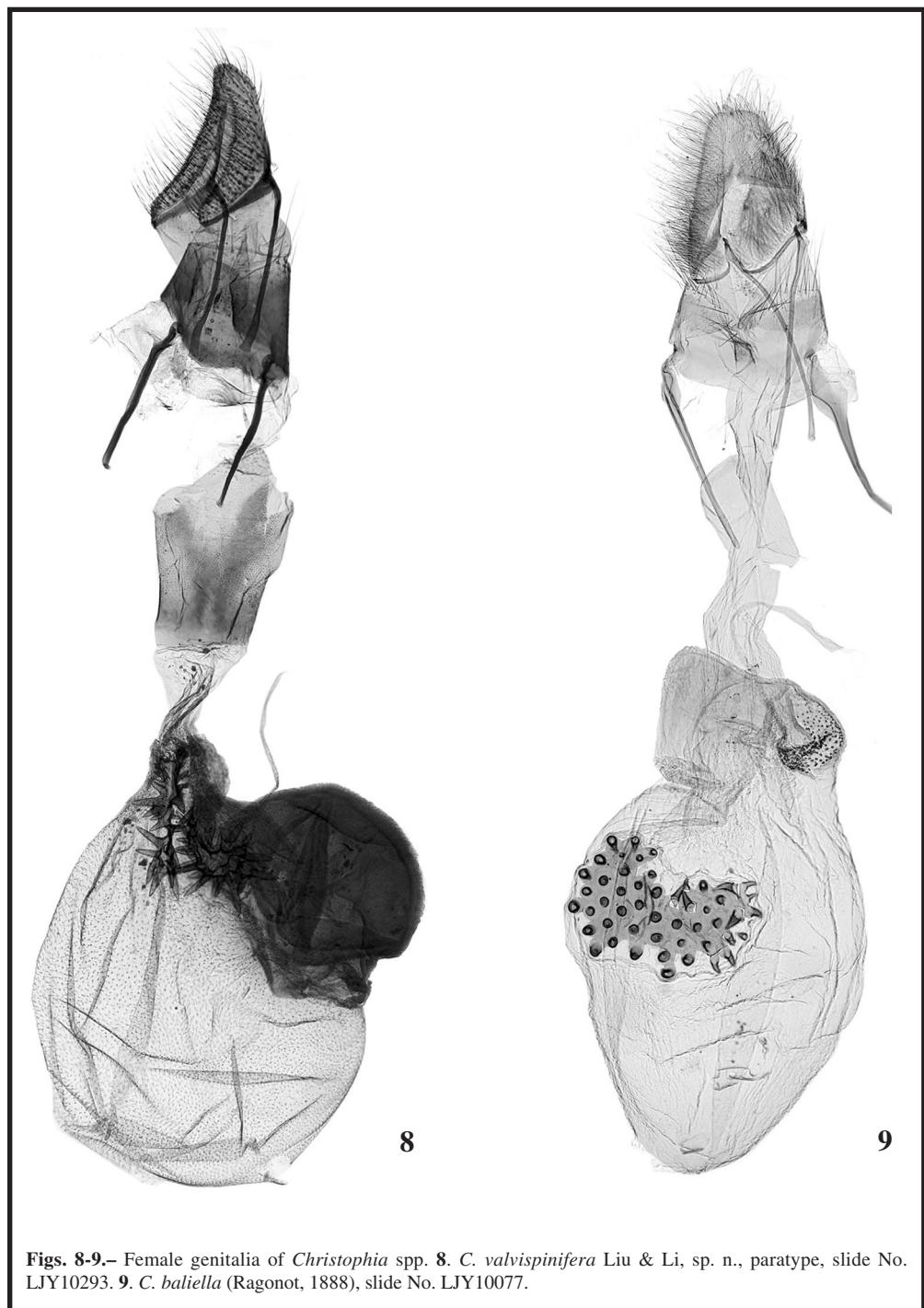
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7a

Figs. 6-7.—Male genitalia of *Christophia* spp. 6. *C. valvispinifera* Liu & Li, sp. n., paratype, slide No. LKY10026. 7. *C. paragranulella* Liu & Li, sp. n., holotype, slide No. LKY09058. 6a, 7a. 8th segment and culicita.



Figs. 8-9.—Female genitalia of *Christophia* spp. **8.** *C. valvispinifera* Liu & Li, sp. n., paratype, slide No. LJP10293. **9.** *C. baliella* (Ragonot, 1888), slide No. LJP10077.